

## Chapter 22 Problems

Source	df	$R^2$	Mean $R^2$	SS	MS	F
X	1	.014	.014	0.715	0.715	
A	3-1=2	.462	.231	24.510	12.255	7.51 *
S/A	3(7-1)-1=17	.524	.0308	27.727	1.631	
Total	20	1.000		52.952		

\*  $p < .05$ ;  $R^2$  and SS are from SPSS output.

1b. Praise =  $1.953 - 1.486(1) + 0.051(1) + 0.387(10.571) = 4.61$   
 Reproof =  $1.953 - 1.486(-1) + 0.051(1) + 0.387(10.571) = 7.58$   
 None =  $1.953 - 1.486(0) + 0.051(-2) + 0.387(10.571) = 5.94$

The estimated marginal means can be computed from the regression coefficients (as above); they are also printed directly in the GLM Univariate output.

1c. For praise vs. reproof:  $\hat{\psi}' = 1(4.61) - 1(7.58) = -2.97$   
 $SS_{\hat{\psi}'_1} = [(5)(\hat{\psi}'_1)^2] / \sum (c_i)^2 = [(7)(-2.97)^2] / [1^2 + (-1)^2] = 30.87 = MS_{\hat{\psi}'_1}$

For praise + reproof vs. none:  $\hat{\psi}' = 1(4.61) + 1(7.58) - 2(5.94) = 0.31$   
 $SS_{\hat{\psi}'_2} = [(7)(0.31)^2] / [1^2 + 1^2 + (-2)^2] = 0.11 = MS_{\hat{\psi}'_2}$

The error term:  $MS'_{error} = (\bar{R}^2_{Y,S/A})(SS_Y) \left( \frac{1 + R^2_{X,A}/k}{1 - R^2_{X,A}} \right) = (0.308)(52.952) \left( 1 + \frac{.211/2}{1 - .211} \right)$   
 $= 1.85$

$F_{\hat{\psi}'_1} = 30.87 / 1.85 = 16.69$        $F_{crit}(1, 17) = 4.45$  for  $\alpha = .05$   
 $F_{\hat{\psi}'_2} = 0.11 / 1.85 = 0.06$

We have good evidence that the population means of the praise and reproof conditions are different, but not good evidence of a difference of praise + reproof with none.

# Regression - For 1a and 1b

## Variables Entered/Removed<sup>b</sup>

Model	Variables Entered	Variables Removed	Method
1	Self-esteem <sup>a</sup>	.	Enter
2	a2, a1 <sup>a</sup>	.	Enter

a. All requested variables entered.

b. Dependent Variable: Number of errors

## Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.116 <sup>a</sup>	.014	-.038	1.658
2	.690 <sup>b</sup>	.476	.384	1.277

## Model Summary

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	.014	.260	1	19	.616
2	.463	7.514	2	17	.005

a. Predictors: (Constant), Self-esteem

b. Predictors: (Constant), Self-esteem, a2, a1

## Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.030	2.028		2.480	.023
	Self-esteem	.096	.189	.116	.510	.616
2	(Constant)	1.953	1.753		1.114	.281
	Self-esteem	.387	.164	.467	2.366	.030
	a1	-1.486	.384	-.764	-3.873	.001
	a2	.051	.197	.046	.261	.797

a. Dependent Variable: Number of errors

# Univariate Analysis of Variance - For 1a and 1b

## Descriptive Statistics

Dependent Variable: Number of errors

Condition	Mean	Std. Deviation	N
None	6.00	1.732	7
Praise	5.00	1.414	7
Reproof	7.14	1.069	7
Total	6.05	1.627	21

## Tests of Between-Subjects Effects

Dependent Variable: Number of errors

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25.225 <sup>a</sup>	3	8.408	5.155	.010
Intercept	2.025	1	2.025	1.241	.281
slf_est	9.130	1	9.130	5.598	.030
condition	24.510	2	12.255	7.514	.005
Error	27.727	17	1.631		
Total	821.000	21			
Corrected Total	52.952	20			

a. R Squared = .476 (Adjusted R Squared = .384)

## Estimated Marginal Means

### Condition

Dependent Variable: Number of errors

Condition	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
None	5.945 <sup>a</sup>	.483	4.925	6.964
Praise	4.613 <sup>a</sup>	.510	3.537	5.688
Reproof	7.586 <sup>a</sup>	.518	6.493	8.678

a. Covariates appearing in the model are evaluated at the following values: Self-esteem = 10.57.

## Regression - For 1c

### Variables Entered/Removed<sup>b</sup>

Model	Variables Entered	Variables Removed	Method
1	a2, a1 <sup>a</sup>	.	Enter

a. All requested variables entered.

b. Dependent Variable: Self-esteem

### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.459 <sup>a</sup>	.211	.123	1.839

a. Predictors: (Constant), a2, a1